**Solutions, Solubility, Acids & Bases**

**Common Misconceptions**

**Part 1: Solutions and Concentrations**

1. Students often do not realize that gases dissolve better in cold water as opposed to hot. They expect all things to dissolve better as the temperature is increased. This misconception can be cleared up by this simple demonstration:
   * Fill a beaker half full of tap water and watch as it appears cloudy at first and then clears from the bottom to the top within a short period of time. This is due to gases escaping from the solution as the air temperature of the room warms the water.
2. Kitchen applications offer many opportunities for a discussion of the difference between melting and dissolving.

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| **Melting** | **Dissolving** |
| Example: Butter in a fry pan   * Heat is required; melting occurs at one specific temperature only (melting point) * Only one substance is involved * Can be undone by freezing | Example: drink crystals in water   * Can occur over a range of temperatures * One substance dissolves in another * Can be undone by evaporating |

**Part 2: Aqueous Solutions and Solubility**

1. Students often misbelieve that stirring a solute-solvent mixture or increasing the surface area of the solute will increase its solubility in a solution. Wrong. They only dissolve the solution faster (higher rate of reaction) but do not increase the solubility of the solute. Heating the solution, on the other hand, will increase the solubility because temperature affects solubility.
2. Students often do not understand how to recombine the ions in a double displacement reaction. Write out the equation and the ions with their charges. Stress that cations and anions only recombine with another of opposite charge. A girl-boy dancing analogy helps them to remember this concept, i.e.
   * (Girl A – Boy B) + (Girl C – Boy D) 🡪 (Girl A – Boy D) + (Girl C – Boy B)

**Part 3: Acids and Bases**

1. Students may think that a higher pH value means more acidic. Reinforce the opposite.
2. Students often drop the decimal or round off a value too soon. Explain the source of error this introduces. Go through the correct significant digits procedure for pH values. Depending on the timing of the math curriculum, logarithms may be new to students, so you may need to give a brief introduction on logarithm.
3. Reinforce that “concentrated” (having a high concentration of particles in mol/L) is different from “strong” (dissociates 100%), and “dilute” (having a low concentration of particles in mol/L) is different from “weak” (dissociates much less than 100%).
4. Be sure to clearly demonstrate excellent titration technique, more than once, if necessary.